Journal of Midwifery & Reproductive Health

JMRH.mums.ac.ir

The Relationship of Obesity and Overweight with Sexual Function in Women of Reproductive Age: A Systematic Review and Meta-Analysis

Golnaz Sadat Ahmadinejad (MSc)[1], Mohammad Reza Same' (MD)[2], Fatemeh Zahra Karimi (PhD)[3,4*], Mahbobeh Abdollahi (PhD)[5]

[1] MSc of Midwifery Counseling, Department of Midwifery, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran
[2] Medical Doctor, School of Medicine, Sabzevar University of Medical Sciences, Sabzevar, Iran
[3] Associate Professor, Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
[4] Department of Midwifery, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran
[5] PhD of Biostatistics, Department of Biostatistics, School of Medical Sciences, Tarbiat Modares University, Tehran, Iran

ARTICLE INFO

Article type:
Review article

Article History:
Received: 30-Aug-2023
Accepted: 13-Nov-2023

Key words:
Obesity
Overweight
Body Mass Index
Sexual Function

ABSTRACT

Background & aim: Obesity and overweight, acknowledged as health issues, which can lead to increased risk of physical and mental diseases and increased probability of sexual dysfunction. This systematic review examined the relationship of obesity and overweight with sexual function in women of reproductive age.

Methods: This systematic review and meta-analysis searched articles in English databases of Cochrane, Scopus, Web of Science, PubMed and Google scholar search engine as well as Persian databases of SID and Magiran without time limitation until the end of 2024, utilizing English keywords of obesity, overweight, sexual function and their Persian equivalents. Observational and descriptive studies meeting the study objective was included in the review. The articles were evaluated using the Newcastle-Ottawa quality review scale. The data analysis was done with STATA software (version 14/1) and the random effects model was used to pool the data for meta-analysis.

Results: Fifteen articles consisting of 7370 participants were included in this systematic review from which five articles were included in the meta-analysis. The random effects model demonstrated a statistically significant relationship between increase in obesity and overweight with decrease in sexual desire (P = 0.003, 95% CI: -0.03, -0.15; SMD = -0.09) and sexual satisfaction in women (P = 0.025; -0.01, -0.07: CI 95%; RR=1.95).

Conclusion: Obesity and overweight are associated with a decline in sexual desire and satisfaction in women. Policymakers should target this population and design preventive interventions such as education, counseling and lifestyle modification strategies to enhance women's sexual function.

► *Please cite this paper as*:
Ahmadinejad GS, Same' MR, Karimi FZ, Abdollahi M. The Relationship of Obesity and Overweight with Sexual Function in Women of Reproductive Age: A Systematic Review and Meta-Analysis. Journal of Midwifery and Reproductive Health. 2025; 13(2): 4663-4677. DOI: 10.22038/JMRH.2023.74680.2194

Introduction

Obesity and overweight are one of the health problems in all societies, which has an increasing prevalence among adults, young people and even children (1). Obesity is often classified by measuring body mass index (BMI), so that people with BMI between 29.9-25 are overweight and people with BMI above 30 are classified as obese(2).

The prevalence of obesity and overweight is currently estimated at approximately 13-43% in

* *Corresponding author*: Fatemeh Zahra Karimi, Associate Professor, Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, Mashhad, Iran. Tel: 00989105712142; Email: karimifz@mums.ac.ir

developed countries and 9-40.5% in developing countries. It can also be said that one to two-thirds of people in all societies are overweight (2,3). Like many other developing countries Iran is also, facing an obesity epidemic and its complications, so that the prevalence of obesity in Iran is estimated in the people of 13 years and above 24.9%, in men 26.53% and in women it is estimated to be 27.84 percent (3). The World Health Organization has estimated that by 2030, 59% of men and 65% of women will be obese, which will cause a 67% increase in cardiovascular disorders and a 21% increase in diabetes (4).

Obesity is considered as one of the threats to public health, obesity and overweight can increase the risk of diseases such as hypertension disorders, metabolic syndrome, diabetes, polycystic ovary syndrome, and obstructive sleep apnea (5). According to the definition of the World Health Organization, health is a multi-dimensional issue that includes not only the physical dimension, but also the psychological and social dimensions. Recently, the concept of sexual health has also been considered in relation to physical and mental health, which the World Health Organization considers to be the harmony and compatibility of physical, emotional, intellectual and social aspects of human sexual affairs. Therefore, it should be noticed that sexual health is an important part of people's lives. It should also be known that different aspects of physical, mental, and sexual health can affect each other and be influenced by each other (6).

Sexual health and the absence of sexual function disorders means that a person enjoys her reproductive and sexual behavior and is far away from factors that inhibit sexual responses and disrupt sexual relationships and function. In obese patients, negative body image, low self-confidence, poor interpersonal relationships, and the feeling of shame and guilt caused by these people's overweight can be the main factors causing sexual dysfunction; because these matters play an important role in sexual relationships. In addition, obesity can be a physical obstacle in sexual relations, therefore, obesity and overweight can be one of the main causes of sexual dysfunction in men and women (7-8).

The mechanisms that can influence the development of sexual disorders in obese and overweight people include: suffering from diseases such as cardiovascular disorders, diabetes, hypertension and hyperlipidemia, and the drugs that are used to treat these illnesses-insulin resistance in obese people and hormonal changes that are related to it and also the cultural and psychological problems caused by obesity (9).

The prevalence of sexual dysfunction in obese and overweight women is reported as 28-45%, and the most common sexual dysfunction in this study is sexual desire and arousal (10). Also, according to the studies which have been done, obesity in women has a negative effect on the stage of the peak of sexual pleasure (orgasm), sexual desire, sexual satisfaction and in men on the stage of ejaculation and erection (11-13). The effect of obesity on sexual disorders is a multifaceted phenomenon that includes: biological, social and psychological factors (14). Studies that have been conducted on the relationship between obesity and overweight with sexual dysfunctions report conflicting results; So that several studies have suggested the existence of a positive relationship between obesity and overweight with sexual dysfunctions (15-16). While a number of studies have not shown any relationship between obesity and sexual dysfunction and consider these are two unrelated subjects (17-18).

Bates et al. (2019), in their study showed a statistically significant difference in having sex and sexual function disorders in obese or overweight women compared to normal weight women, so that weight loss has a significant effect on improving function disorders in obese and overweight women (15). Also, Mustafa et al. (2018) showed the relationship between obesity and sexual dysfunction, so that the prevalence of pain during sexual intercourse, difficulties in becoming slippery and defects in sexual arousal in obese women were reported 69/3%, 53/3% and 52% respectively (16). However, the population-based study conducted by Karadag et al. (2014) in Turkey reported that the occurrence of sexual dysfunction in obese women could be due to the other influencing variables such as hypertension, diabetes and cardiovascular disorders. So, obesity is not

considered an independent factor in causing sexual dysfunction (17). Rene Moreh et al. (2013) showed that sexual function disorders have a significant relationship with the age of people, but the occurrence of these disorders is not related to obesity or overweight in these people (18). Also, Faridi et al. (2013), in their study, showed no significant relationship between obesity and overweight with sexual performance of women (3).

Considering the consequences of obesity and overweight and its impact on marital life, sexual function and fertility in women, scientists are looking for the best solution to improve the personal and social conditions of these people. Also, the level of body mass index is increasing among different societies, and obese or overweight people is being increased, especially among women. Therefore, a definitive conclusion in this field requires more extensive studies on the relationship between obesity and sexual function. Systematic review and meta-analysis are necessary studies to summarize the available evidence in a precise, correct and reliable manner. Despite the fact that several studies have been conducted regarding the effect of obesity on women's sexual function, but conflicting results of these studies made it necessary to conduct a meta-analysis to obtain a clear and consistent result in order to provide a comprehensive guide for researchers and policymakers. Therefore, the present systematic review and meta-analysis was conducted to investigate the relationship between obesity and overweight with sexual function in women of reproductive age.

Materials and Methods

The current systematic review and meta-analysis was conducted based on the guidelines of the Preferred Reporting Items for the Systematic Reviews and Meta-Analyses (PRISMA 2020 check list). For this purpose, the articles indexed in databases of Cochrane, Scopus, Web of Science, PubMed and Google scholar search engine as well as Persian databases of SID and Magiran were searched using English keywords of Obesity, Overweight, Body Mass Index, Sexual dysfunction, Sexual functioning, sexual disorder and their Persian equivalents using Boolean operators of AND/ OR without time limit until the end of 2024. In order to access more studies, the references of the reviewed articles were also reviewed to access other related articles.

The inclusion criteria consisted of observational and descriptive studies in Persian or English related to the purpose of the research. The exclusion criteria included lack of access to the full text of the articles and the articles whose authors did not answer to the researchers' contact, review studies, letters to the editor, articles presented in conferences, case reports, interventional studies, duplicate documents, articles with incomplete and unrelated data from the study. All the articles were, independently, searched with the keywords mentioned in the title, abstract, and keywords. After removing duplicate documents, the remaining studies were screened and irrelevant articles were removed. Then, the full text of the remaining studies was retrieved and eligible articles were identified and included in the present review.

The quality of the articles included in the systematic review was assessed using the Newcastle-Ottawa Quality Assessment Scale for observational studies. In order to reduce the bias, the quality of the articles was checked by two independent assessors, and if there was any disagreement between two evaluators, the article was discussed and reviewed in the presence of the senior researcher (FZK) to reach a consensus. The Newcastle-Ottawa quality review scale (observational studies version) is a standard scale for evaluating the quality of observational articles. This scale evaluates the articles in terms of the selection process (in four sections of definition of cases, introduction of cases, selection of controls and definition of controls), comparability (in one section includes: the comparability of cases and controls based on analysis design) and exposure/outcome (in three sections including: measurement of exposure/outcome, the same method of measuring exposure/outcome for cases and controls, and the degree of non-response to exposure/outcome (19). The scoring of the scale is like that if the items considered in the scale are mentioned, the number 1 is given and if not, the number 0 is assigned. The total scores assigned to the reported items are considered as the total

quality score of the article. According to the Newcastle-Ottawa scale, the highest score that each article can get is 10 (the strongest study) and the lowest score is zero (the weakest study). In order to evaluate the quality, the articles that get a score lower than the average score (less than 4 points) were considered as low quality.

Two authors, independently, collected the required data for the studies and recorded it in the checklist designed by the research team. Extracted data from the articles included: first author's name, year of study publication, study location, study design, sample size, tools, results, and total quality score obtained from the Newcastle-Ottawa scale. After collecting the data, the extracted data was reviewed. If two researchers had different opinions about the data, the problem was referred to the senior researcher (FZK) and the final decision was made by him. In the first stage, the process of qualitative synthesis of the extracted data was done for systematic review. Then, in order to perform quantitative data synthesis, the data extracted from the articles that were suitable for meta-analysis were entered in the Stata Version 14 software.

Considering that the investigated index was the relationship between obesity and overweight with sexual function, to combine the results of different studies, the mean and standard deviation and the standardized mean difference index were used. The I^2 index was used to check the heterogeneity between studies and in case of heterogeneity, the random effects method was used. The I^2 index less than 0.25 indicates low, between 0.25-0.75 indicates moderate and greater than 0.75 indicated high heterogeneity. Sensitivity analysis was used to check the robustness of the results of meta-analysis, and Begg's test was used to check the publication bias. In case of publication bias, Trim and Liff method was used to combine studies. P value less than 0.05 was considered significant.

Results

Through the initial search of databases, 1803 articles were first retrieved, after removing 1620 duplicate and unrelated articles, 183 articles were evaluated based on the inclusion criteria. Finally, after removing 168 articles, 15 full-text articles were included in the systematic review. From these, 10 articles were excluded from entering the quantitative stage due to incomplete data reporting or not reporting of indicators required to enter the meta-analysis, and finally five articles entered the meta-analysis. The flow chart of the studies is shown in figure 1.

The characteristics of the studies included in the study and their quality scores are shown in Table 1. All studies were cross-sectional and case-control. The publication year of the studies varied from 2007 to 2020. In all articles, three articles were published in Persian and 12 articles were published in English (Table 1).

Table 1. Characteristics of published studies included in the systematic review

Author / Year / Reference No.	Study place	Study design	Sample size	Scale	Results	Score obtained from the Newcastle-Ottawa Scale
1. Mozafari et al. (2014) (20)	Iran	Case - control	Case group: 64 women Control group: 64 women	Female Sexual Function Index (FSFI)	The average score of FSFI in the group with BMI>25 was 20.45±9.4 and in the group with BMI<25 it was 16.2±2.8. And sexual function was significantly lower in the group with body mass index greater than 25 (p<0.05).	6
2. Esposito et al	Nepal/Italy	Case - control	Case group: 52	FSFI	The average score of FSFI in the BMI >25 group was	6

Author / Year / Reference No.	Study place	Study design	Sample size	Scale	Results	Score obtained from the Newcastle-Ottawa Scale
(2007) (21)			Control group: 66		21.9 ± 1 and in the BMI <25 group, It was 16.8 ± 3.1. The average score of FSFI had a significant relationship with BMI (P=0.0001 and r=-1.72).	
3. Faridi et al (2013) (3)	Iran	Cross-sectional	330 women	FSFI	The average score of FSFI in the BMI >25 group was 26.38 ± 5.51 and in the BMI <30-25 group, it was 26.76 ± 3.49. There was no statistically significant relationship between body mass index and the total score of sexual performance and its domains (p<0.05).	6
4. Karimi et al (2019) (14)	Iran	Cross-sectional	126 women of reproductive age	FSFI	The average score of FSFI in the group of people with BMI > 25 was 66.2 ± 11.3 and in the group of people with BMI < 25-30, it was 72.5 ± 15.5. There is a statistically significant difference between sexual function with overweight and obesity (P<0.001).	7
5. Fabion et al (2020) (22)	Scotland	Cross-sectional	6668 women of reproductive age	FSFI and Female Sexual Distress Scale-Revised (FSDS-R)	Overweight or obesity was associated with a decrease in sexual activity (P < 0.001). Decreased sexual performance in obese women in areas such as sexual arousal, lubrication, satisfaction, orgasm, and pain, and higher levels of sexual discomfort had a statistically significant difference (P < 0.001).	8
6. Nardo et al (2020) (23)	Italy	Case - control	Case group: 186 Control group: 233	FSFI	No difference in the prevalence of FSD was found between overweight/obese (44.4%) and normal-weight women (55.6%), even though significant between-group differences in body image were found. Structural Equation Modelling (SEM) showed that BMI contribute to FSD only	6

Author / Year / Reference No.	Study place	Study design	Sample size	Scale	Results	Score obtained from the Newcastle-Ottawa Scale
					through the mediating role of body dissatisfaction and self-esteem.	
7. Raisi M et al (2013) (25)	Iran	Case - control	Case group: 77 Control group: 64	FSFI	The mean BMI in the case group was 34.1±5.4 and in the control group was 26±4.4, in which case the statistical test showed a significant relationship between body mass index and sexual dysfunction ($p<0.05$). Also, in the case group, the most disturbance was observed in the arousal phase and in the control group in the sexual pain phase ($p<0.05$).	5
8. Yaylali et al (2010) (13)	Italy	Case - control	Case group: 45 Control group: 30	FSFI	The comparison of total FSFI scores between patients and controls showed no significant difference (P=0.74). As the FSFI score of ⩽26.55 indicated FSD, 86% of obese patients and 83% of controls were considered to have sexual dysfunction. The mean total FSFI score was 22.1±4.3 for obese patients and 23.1±3.7 for healthy women.	5
9. Kadioglu et al (2010) (26)	Turkey	Case - control	Case group: 64 Control group: 27	FSFI	This study showed that obesity has no significant relationship with FSD, but obese patients were found to be in a more depressive mood than age-matched normal counterparts	5
10. Erenel et al (2013) (27)	Turkey	Descriptive analytical	203 women with BMI>30	FSFI	The mean FSFI score of the participants was 27.36 ± 4.80. Severe dysfunction were observed in 12.8 % of the participants. Moreover, all domains of sexual function were dysfunctional	5
11. Østbye T et al (2013) (28)	U.S.A	Descriptive analytical	134 women and 91men with	FSFI	Scores were lower for women than for men, indicating reduced sexual	4

Author / Year / Reference No.	Study place	Study design	Sample size	Scale	Results	Score obtained from the Newcastle-Ottawa Scale
			overweight		functioning. Increasing body mass index was associated with decreasing sexual functioning only for arousal and behavior.	
12.Yazdznpanahi et al (2016) (29)	Iran	Cross-sectional	514 women of reproductive age	FSFI	The only significant relationships were found between sexual desire and arousal and BMI and between central obesity and sexual arousal and satisfaction.	6
13. Steffen KJ (2017) (30)	U.S.A	Cross-sectional	2458 overweight and obese men and women	FSFI	Twenty-six percent of women and 12% of men reported no sexual desire. Physical health limited sexual activity at least moderately in 38% of women and 44% of men. About half of women (49%) and men (54%) were moderately or very dissatisfied with their sexual life.	6
14.Assimakopoulos et al (2006) (31)	Greece	Observational	Case group: 60 Control group: 50	FSFI and Hospital Anxiety and Depression Scale (HADS)	Obese women reported significant impairment on most domains of sexual function, including sexual desire, arousal, lubrication, orgasm, and satisfaction, compared to healthy controls. The observed sexual impairment was associated with BMI	4
15.Darmohammadi et al (2012) (32)	Iran	Correlation study	Case group: 143 Control group: 143	FSFI	Obesity in women is associated with sexual dysfunction, impaired self-image, and reduction of life quality. Therefore, in order to enhance sexual performance, and improve quality of life and self-image, losing weight is mostly recommended obese women.	5

The results of the meta-analysis of the studies of Mozafari et al. (2014) and Sponit et al. (2007) using the standardized mean difference effect size showed that there was heterogeneity between studies based on the I^2 index (I2=0.71). So, the random effects method was used to combine the studies and their final result of the study effects. Based on the results

of the random effects method, there was no statistically significant difference between the two groups of cases (BMI <25) and controls (BMI <25), in terms of the average total score of sexual function (P = 0.081); So that the standardized mean difference between the two groups was estimated as -1.40 with a confidence interval (0.17, -2.97) (Figure 2).

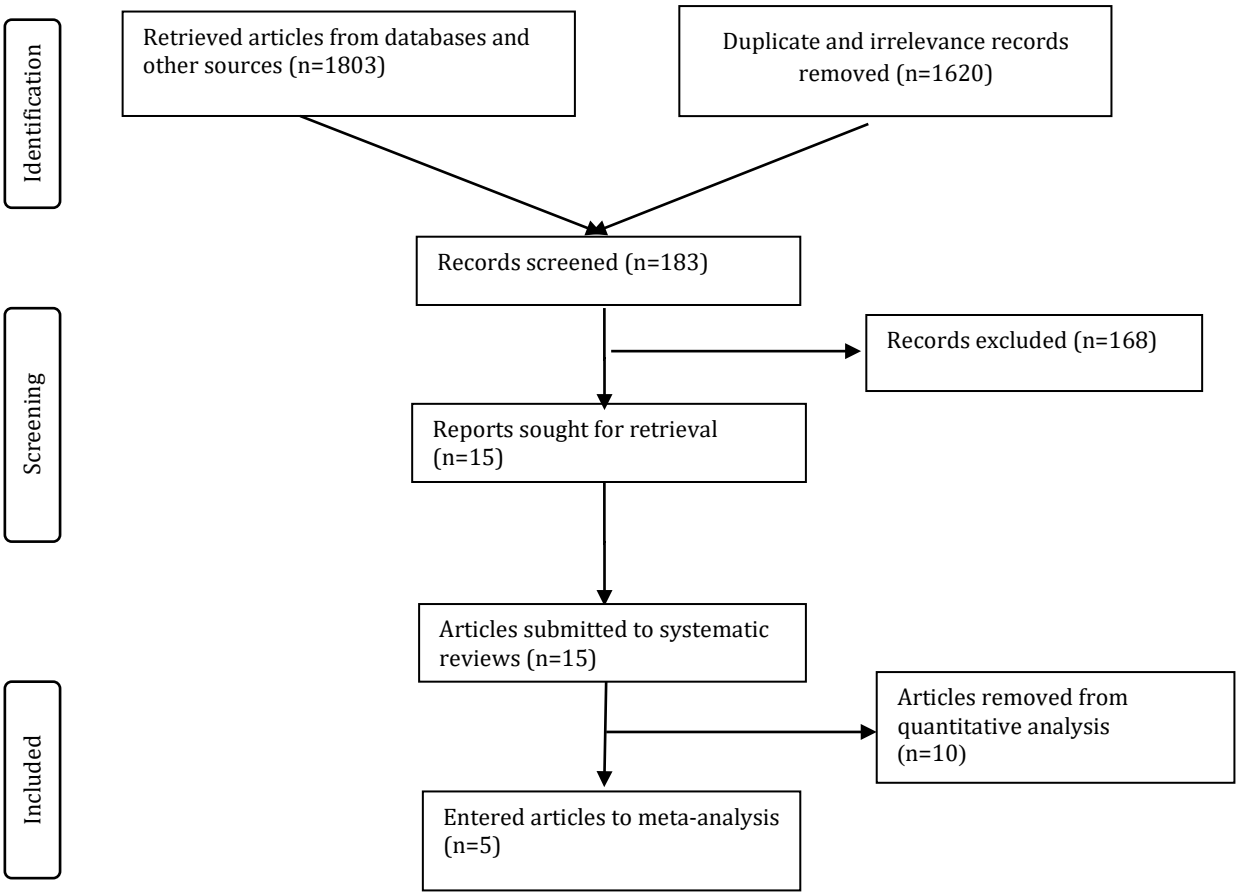

Figure 1. Study selection steps based on the PRISMA 2020 flow diagram

In other words, there was no significant difference in the mean score of the total sexual function in the case and control groups. Also, based on the results of Begg's test, there was no publication bias in the studies (P=0.317). The results of the meta-analysis of the studies, Faridi et al. (2013), Karimi et al. (2019), Fabion et al. (2020) using the standardized mean difference effect size, showed that there was heterogeneity between the studies based on the I^2 index (I^2=0.57), so random effects method was used to combine the studies and the final result of the study effects. Based on the results of the random effects method, there was no statistically significant difference between the two groups of cases (BMI = 25-30) and controls (BMI < 25), in the total score of sexual function (P = 0.480); So that the standardized mean difference between the two groups was estimated as -0.07 with a confidence interval of (0.12, -0.26) (Figure 3).

In other words, there was no significant difference in the mean score of the total sexual function in the case and control groups. Also, based on the results of Begg's test, there was no

publication bias in the studies (P=0.602). The results of the meta-analysis of articles by Faridi et al.(2013), Karimi et al.(2020), Fabion et al.(2020) in the desire subscale using the standardized mean difference effect size showed that there is heterogeneity between studies based on the I^2 index (I2=0.10), So, the fixed effect method was used to combine the studies and the final result of the study effects. Based on the results of the fixed effect method, there was

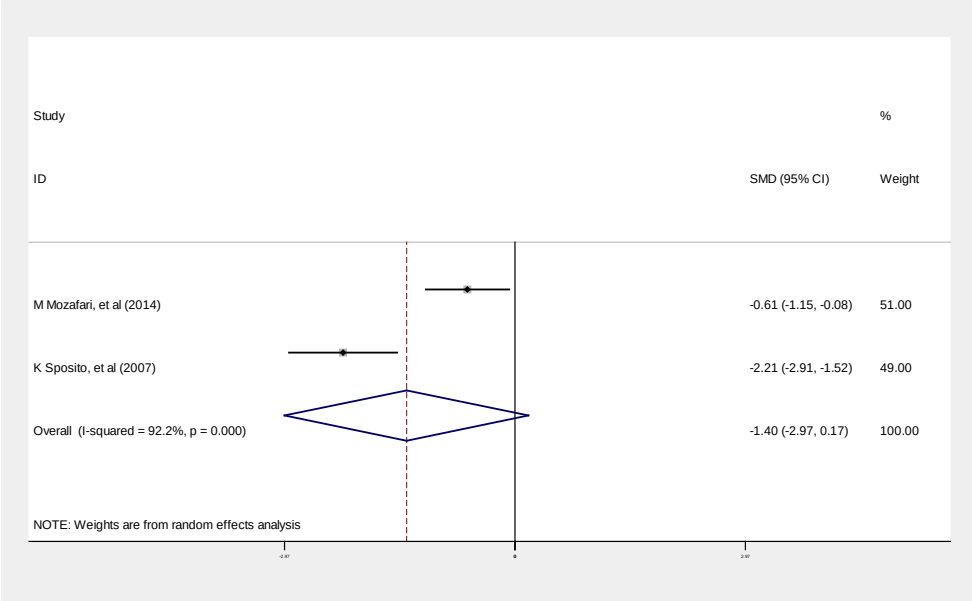

Figure 2. The pooled prevalence of sexual function in women

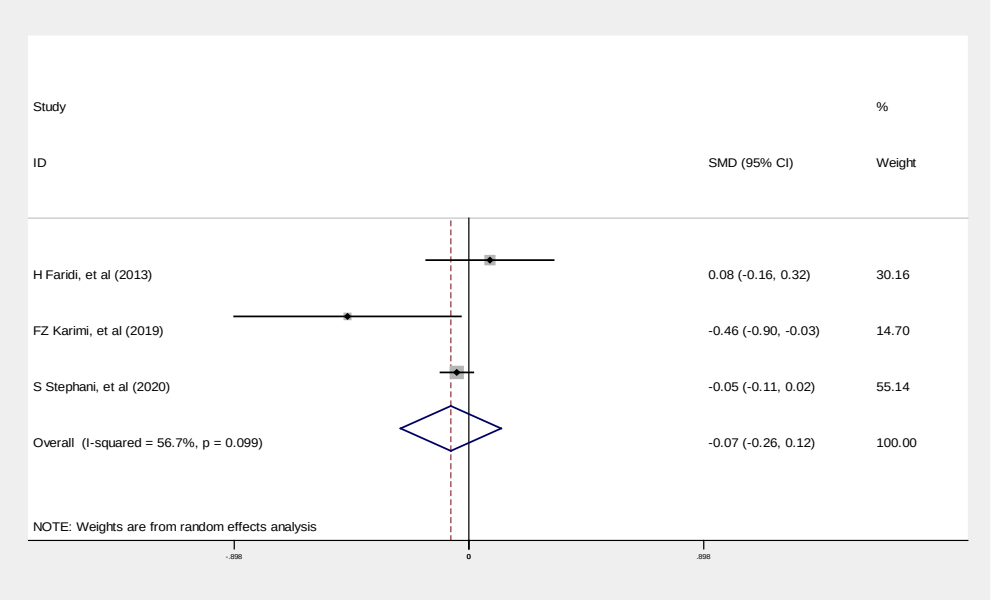

Figure 3. The pooled prevalence of sexual function in women

a statistically significant difference between the two groups (BMI = 25-30) and control (BMI < 25) (P = 0.003); The standardized mean difference between the two groups was estimated as -0.09 with a confidence interval of (-0.03, -0.15) (Figure 4).

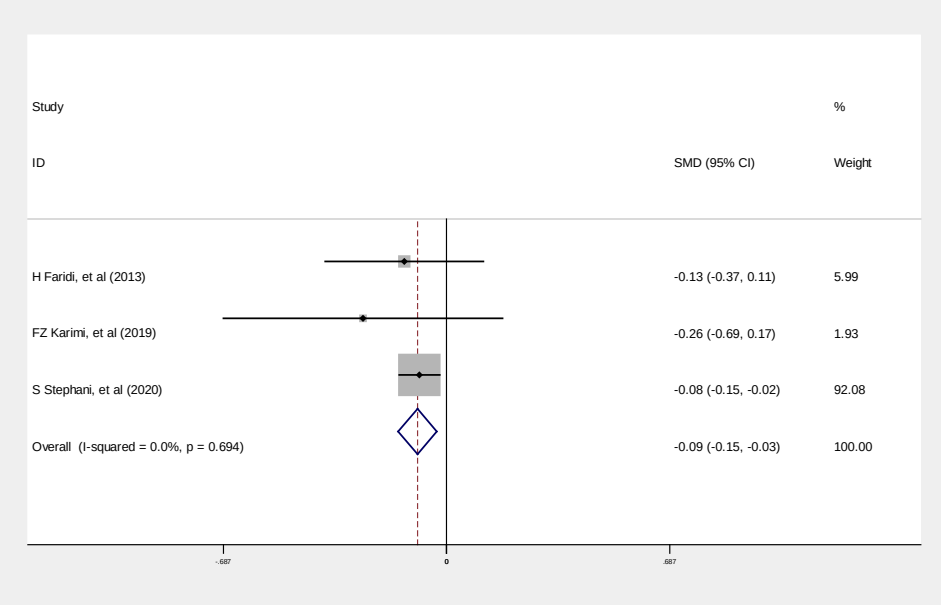

Figure 4. The pooled prevalence of sexual function in women

The mean score of desire in the case and control groups had a significant difference and it was lower in the case group. Also, based on the results of Begg's test, there was no publication bias in the studies (P=0.117). The results of the meta-analysis of the studies by Faridi et al. (2013), Karimi et al. (2019), Fabion et al. (2020) in the satisfaction subscale using the standardized mean difference effect size showed heterogeneity between the studies based on the I^2 index. (I2=0.10), Therefore, the fixed effect method was used to combine the studies and the final results of the study effects. Based on the results of the fixed effect method, there was a statistically significant difference between the two groups of cases (BMI = 25-30) and controls (BMI < 25) (P = 0.025); So that the standardized mean difference between the two groups was estimated as -0.07 with a confidence interval (-0.01, -0.13) (Figure 5).

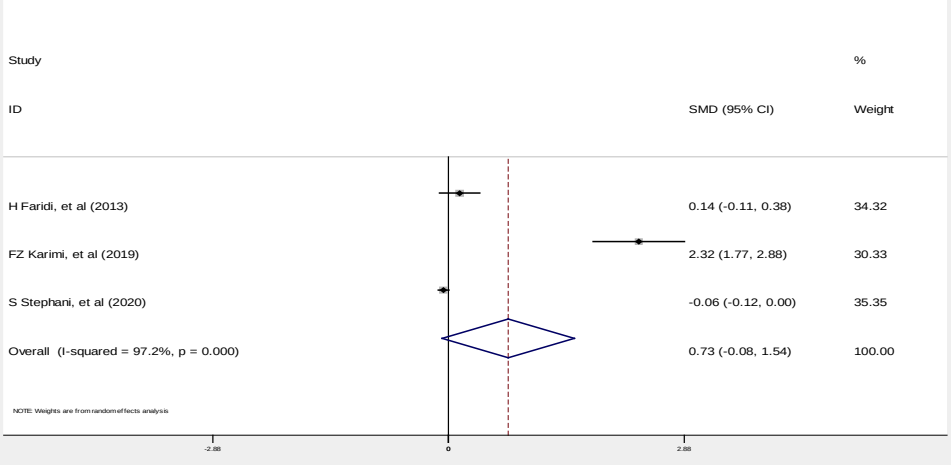

Figure 5. The pooled prevalence of sexual desire in women

Also, there was a significant difference in the mean satisfaction score between the case and control groups and it was lower in the case group. In addition, based on the results of Begg's test, there was no publication bias in the studies (P=0.117). In other sub-scales, there was no statistically significant difference between the case and control groups (P<0.05) (Figure 6).

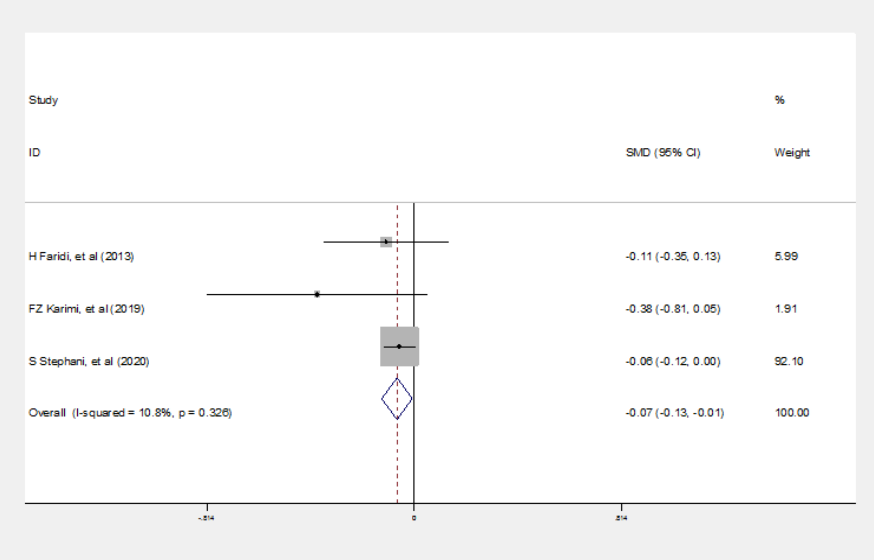

Figure 6. The pooled prevalence of sexual satisfaction score in women

Discussion

The results of present systematic review and meta-analysis showed that obesity and overweight can cause a significant decrease in sexual desire and sexual satisfaction of obese and overweight women. Medical diseases (such as cardiovascular disorders, diabetes, metabolic syndrome, polycystic ovary syndrome, etc.), change in the level of circulation of hormones that are affective in sexual responses and desire, change in a person's mental image of her body and negative self-concept are several mechanisms which can be potentially effective and can lead to sexual dysfunctions such as decreased sexual desire and satisfaction in obese and overweight women. A negative mental image of the body can lead to adverse psycho-social symptoms, such as anorexia or bulimia nervosa, depression, social anxiety, and sexual desire disorders (5, 6, 9).

Mozafari et al. (2015) showed in their study that obesity and overweight can lead to a decrease in sexual satisfaction in these women and affect their quality of life and sexual health. Obesity can reduce self-confidence and sexual satisfaction in women by creating negative self-image and unpleasant perceptions of body image in women (20). Also, Pace et al. (2010) in their study showed that women with obesity and overweight have a lower level of sexual satisfaction than women with normal weight (24). Raisi et al. also showed that overweight women have less sexual satisfaction, sexual desire (Libido) and orgasm (25). The study of Rostami et al. (2020) also showed that overweight and obesity in women with its effects on the increase of sex hormones and the risk of polycystic ovarian syndrome and causing unpleasant changes in a person's appearance, such as acne and excess hair, reduces the desirability of body image and leads to defects sexual function in these women (33). The results of the study by Karimi et al. (2019) showed that obesity and overweight can cause a decrease in sexual desire in women, disrupt women's marital relationships, and affect their quality of life (8).

It can be said that negative body image, low self-confidence, lack of interpersonal relationships, and feeling ashamed due to high

weight are among the effective reasons for reducing sexual desire in obese women (14). In study y Bates et al. (2019), they also showed a statistically significant relationship between obesity and overweight with decreased sexual desire, the most common disorder in this study was related to sexual desire and orgasm (15).

But Mozafari et al. (2015) did not show a statistically significant relationship between obesity and sexual desire in their study. In this study, psychological factors and interpersonal relationships were known to be more effective than body mass index and overweight on the sexual function of overweight and obese women, which is not agree with the results of the present study (20) .The reason for this inconsistency can be considered the difference in the individual and social characteristics of people and the cultural extent between different societies.

The results of a study on women with hyperlipidemia showed that body mass index is independently related to sexual dysfunction and the scores of arousal, desire, slippery and satisfaction areas are lower than the group without hyperlipidemia (34). Also, in another study on women with metabolic syndrome (a set of common disorders associated with abdominal obesity), it was observed that the overall score of sexual function in women with this disease was lower than the control group, and the most statistically significant difference was in the areas of arousal, orgasm and satisfaction (35). Also, Fabion et al. (2020) showed in their study that overweight or obesity is associated with a decrease in sexual activity, and the decrease in sexual function in obese women has a statistically significant difference in areas such as sexual arousal, satisfaction, orgasm, and pain (22).

However, the underlying mechanism of obesity related to sexual dysfunction has not been clearly established. Previous studies show that psychological and social factors such as a person's perception of her body, depression, low self-confidence and negative self-image can have a negative effect on the self-esteem and sexual function of people. Also, the negative effects of co-morbidities in obese people, such as hypertension, diabetes, metabolic syndrome, etc., have been clearly proven on sexual dysfunctions (36). According to that women's sexual health is one of the priorities of the World Health Organization, and unfavorable sexual function can have a negative effect on women's sense of efficiency, worthiness and self-confidence, and it can increase the concern of couples about the stability and strength of their joint life, So special attention should be paid to the diseases and factors influencing the sexual desire, ability and function of people (37-38).

Considering the importance of optimal sexual function in women, the significant prevalence of obesity and overweight and its clinical importance, it seems that surveying the sexual function of affected women, in order to know more about the dimensions of sexual dysfunction in these women and to adopt preventive measures such as education And early counseling about nutrition, physical activity, mental health, and lifestyle improvement is necessary to improve the quality of sexual life of these people (39). Because of that the previous studies on the relationship between obesity and sexual function are mostly narrative and systematic reviews, therefore, the meta-analysis of the present study is considered to be one of its advantages. In the present study, some articles were excluded from entering the meta-analysis stage due to the lack of a control group, incomplete reporting of results, or due to the lack of reporting of the mean and standard deviation of the total score of sexual function, which is one of the limitations of this study, Therefore, the conclusions from the present study should be considered carefully.

It is suggested that in future researches, interventional studies should be designed to reduce the occurrence of sexual dysfunction in obese and overweight women. In addition, the effective factors in the occurrence of sexual disorders in these women have been investigated separately, and strategies to reduce sexual disorders and their complications in this group of women have been proposed.

Conclusion

Obesity and overweight can lead to a decrease in sexual desire and satisfaction in women, so policymakers and health care providers should identify this group of women in terms of the

occurrence of sexual dysfunction and provide suitable interventions to improve the sexual function of this group of women.

Declarations

Acknowledgements

This study is the result of a research proposal that was approved by Mashhad University of Medical Sciences (code: 4020128). We hereby thank and appreciate The Vice president for Research of Mashhad University of Medical Sciences and also all the researchers whose studies were used in this systematic review and meta-analysis.

Conflicts of interest

Authors declared no conflicts of interest.

Ethical considerations and ethical approval

In order to comply with ethics in the research, the ethics code of IR.MUMS. NURSE. REC.1402.044 was obtained from the Local Research Ethics Committee, Mashhad University of Medical Sciences, Mashhad, Iran.

Funding

Not applicable.

Authors' contribution

FZK: Conceptualization, reviewing the studies, writing and editing; GSA: Rreviewing the studies, writing and editing; MA and MRS: Analysis and editing. All authors read and approved the final manuscript.

References

1. Maddah M. The Factors associated with adult obesity in Iran: A review. Iranian Journal of Nutrition Sciences & Food Technology. 2012; 7(1): 119–127.
2. Kompaniyets L, Goodman AB, Belay B, Freedman DS, Sucosky MS, Lange SJ, Gundlapalli AV, Boehmer TK, Blanck HM. Body Mass Index and Risk for COVID-19-Related Hospitalization, Intensive Care Unit Admission, Invasive Mechanical Ventilation, and Death - United States, March-December 2020. Morbidity and Mortality Weekly Report. 2021; 70(10): 355-361.
3. Faridi H, Najar S, Javadnoori M. The relationship between body mass index and women sexual function. The Iranian Journal of Obstetrics, Gynecology and Infertility. 2013; 16(74): 20-28.
4. Dadgar S, Karimi FZ, Bakhshi M, Abdollahi M, Rahimzadeh Borj F. Assessment of sexual dysfunction and its related factors in pregnant women referred to Mashhad health centers (2017-2018). The Iranian Journal of Obstetrics, Gynecology and Infertility. 2018; 21(8): 22-29.
5. Kim D, Hou W, Wang F, Arcan C. Factors affecting obesity and waist circumference among US adults. Preventing Chronic Disease. 2019; 16: E02.
6. Karimi FZ, Dadgar S, Abdollahi M, Norouzi Z. Influence of rheumatoid arthritis on women's sexual function: A systematic review and meta-analysis. The Iranian Journal of Obstetrics, Gynecology and Infertility. 2019; 22(8): 74-84.
7. Esfahani SB, Pal S. Obesity, mental health, and sexual dysfunction: A critical review. Health Psychology Open. 2018; 5(2): 2055 102918786867.
8. Karimi FZ, Miri HH, Salehi F, Maleki-Saghooni N, Anbaran ZK, Amiri-Farahani L. The Relationship Between Obesity and Sexual Function in Iranian Women. Zahedan Journal of Research in Medical Sciences. 2020; 22(3).
9. McCabe MP, Sharlip ID, Lewis R, Atalla E, Balon R, Fisher AD, et al. Risk Factors for Sexual Dysfunction Among Women and Men: A Consensus Statement From the Fourth International Consultation on Sexual Medicine. 2015. Journal of Sexual Medicine. 2016; 13: 153-167.
10. Martins e Silva B, Rêgo LM, Galvão MA, Florêncio TM, Cavalcante JC. Incidence of sexual dysfunction in patients with obesity and overweight. Journal of Brazilian College of Surgeons. 2013; 40:196-202.
11. Esposito K, Giugliano D. Obesity, the metabolic syndrome,and sexual dysfunction in men. Clinical Pharmacology and Therapeutics. 2011; 90: 169-73.
12. Jamali S, Zarei H, Rasekh Jahromi A. The relationship between body mass index and sexual function in infertile women: A cross-sectional survey. The Journal of Sexual Medicine. 2014; 12(3): 189-198.
13. Yaylali GF, Tekekoglu S, Akin F. Sexual dysfunction in obese and overweight women. International Journal of Impotence Research. 2010; 22(4): 220-226.
14. Aballay LR, Eynard AR, Díaz Mdel P, Navarro A, Muñoz SE. Overweight and obesity: a review of their relationship to metabolic syndrome, cardiovascular disease, and cancer in South America. Nutrition Reviews. 2013; 71(3): 168-179.

15. Bates JN, Pastuszak AW, Khera M. Effect of Body Weight on Sexual Function in Men and Women. Current Sexual Health Reports. 2019; 11: 52-59.
16. Mostafa AM, Khamis Y, Helmy HK, Arafa AE, Abbas AM. Prevalence and patterns of female sexual dysfunction among overweight and obese premenopausal women in Upper Egypt; a cross sectional study. Middle East Fertility Society Journal. 2018; 23: 68-71.
17. Karadag H, Oner O, Karaoglan A, Orsel S, Demir AU, Firat H, et al. Body mass index and sexual dysfunction in males and females in a population study. Klinik Psikofarmakoloji Bülteni-Bulletin of Clinical Psychopharmacology. 2014; 24: 76-83.
18. Moore RH, Sarwer DB, Lavenberg JA, Lane IB, Evans JL, Volger S, et al. Relationship between sexual function and quality of life in obese persons seeking weight reduction. Obesity (Silver Spring). 2013; 21(10): 1966-1974.
19. Luchini C, Veronese N, Nottegar A, Shin JI, Gentile G, Granziol U, Soysal P, Alexinschi O, Smith L, Solmi M. Assessing the quality of studies in meta-research: Review/guidelines on the most important quality assessment tools. Pharmaceutical Statistics. 2021; 20(1): 185-195.
20. Mozafari M, Khajavikhan J, Jaafarpour M, Khani A, Direkvand-Moghadam A, Najafi F. Association of body weight and female sexual dysfunction: a case control study. International Journal of Impotence Research .2015; 17(1): e24685.
21. Esposito K, Ciotola M, Giugliano F, Bisogni C, Schisano B, Autorino R, et al. Association of body weight with sexual function in women. International Journal of Impotence Research. 2007; 19(4): 353-357.
22. Faubion SS, Fairbanks F, Kuhle CL, Sood R, Kling JM, Vencill JA, et al. Association Between Body Mass Index and Female Sexual Dysfunction: A Cross-sectional Study from the Data Registry on Experiences of Aging, Menopause, and Sexuality. Journal of Sexual Medicine. 2020; 17(10): 1971-1980.
23. Di Nardo M, Conti C, Di Francesco G, Nicolardi G, Guagnano MT, Porcelli P. What is the "weight" of body mass index on sexual functioning in women? A mediation model. Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity. 2021; 26: 1801-1811.
24. Pace G, Silvestri V, Gualá L, Vicentini C. Body mass index, urinary incontinence, and female sexual dysfunction: how they affect female postmenopausal health. Menopause. 2009; 16(6): 1188-1192.
25. Raisi M, Ahmari Tehran H, Jafarbegloo E, Khoramirad A, Noroozi M. Association of Body Mass Index with Sexual Dysfunction in Women Referred to Health Centers of Qom City, 2010, Iran. Qom University of Medical Sciences. 2013; 7 (5): 53-59.
26. Kadioglu P, Yetkin DO, Sanli O, Yalin AS, Onem K, Kadioglu A. Obesity might not be a risk factor for female sexual dysfunction. BJU international. 2010; 106(9): 1357-1361.
27. Erenel AŞ, Kılınc FN. Does obesity increase sexual dysfunction in women. Sexuality and Disability. 2013; 31: 53-62.
28. Østbye T, Kolotkin RL, He H, Overcash F, Brouwer R, Binks M, Syrjala KL, Gadde KM. Sexual functioning in obese adults enrolling in a weight loss study. Journal of Sex & Marital Therapy. 2011; 37(3): 224-235.
29. Yazdznpanahi Z, Beygi Z, Akbarzadeh M, Zare N. Investigating the relationships between obesity and sexual function and its components. Shiraz E-Medical Journal | Home. 2016; 17(9): e38573.
30. Steffen KJ, King WC, White GE, Subak LL, Mitchell JE, Courcoulas AP, Flum DR, Strain G, Sarwer DB, Kolotkin RL, Pories W, Huang AJ. Sexual functioning of men and women with severe obesity before bariatric surgery. Surgery for Obesity and Related Diseases. 2017; 13(2): 334-343.
31. Assimakopoulos K, Panayiotopoulos S, Iconomou G, Karaivazoglou K, Matzaroglou C, Vagenas K, Kalfarentzos F. Assessing sexual function in obese women preparing for bariatric surgery. Obesity Surgery. 2006; 16(8): 1087-1091.
32. Darmohammadi, J., Farzaneh, Aghaei, M. Afzal, Kazemeini, B. H. The relationship between sexual function and obesity in women. Iranian Journal of Obstetrics, Gynecology and Infertility. 2012; 15(24): 26-33.
33. Rostami Dovom M, Ramezani Tehrani F. A Review of the Relationship between Obesity and Some Sexual Dysfunction in Men and Women. Iranian Journal of Endocrinology and Metabolism 2020; 21 (5) :319-328.
34. Esposito K, Ciotola M, Maiorino MI, Giugliano F, Autorino R, De Sio M, et al. Hyperlipidemia and sexual function in premenopausal women. Journal of Sexual Medicine. 2009; 6(6): 1696-1703.
35. Esposito K, Ciotola M, Marfella R, Di Tommaso D, Cobellis L, Giugliano D. The metabolic syndrome: a cause of sexual dysfunction in women. International Journal of Impotence Research. 2005; 17(3): 224-226.
36. Rastrelli G, Lotti F, Reisman Y, Sforza A, Maggi M, Corona G. Metabolically healthy and unhealthy obesity in erectile dysfunction and male infertility. Expert Review of Endocrinology & Metabolism. 2019; 14(5): 321-334.
37. Levine R, Beck T, Demirgüç-Kunt A. A new database on the structure and development of

the financial sector. World Bank Economic Review. 2000; 14(3): 597-605.
38. Salari P, Nayebi NA, Modarres GM, Vahid RF, Jabbari NH. Surveying the relationship between adult attachment style to parents with female sexual function. Journal of Fundamentals of Mental Health. 2012; 13(4): 346-355.
39. Noroozi M, Gholamzadeh-Baeis M. The Serum Level of Vitamin D and its Association with Disease Severity in Patients with Rheumatoid Arthritis. The Journal of Isfahan Medical School. 2017; 34(405): 1311.